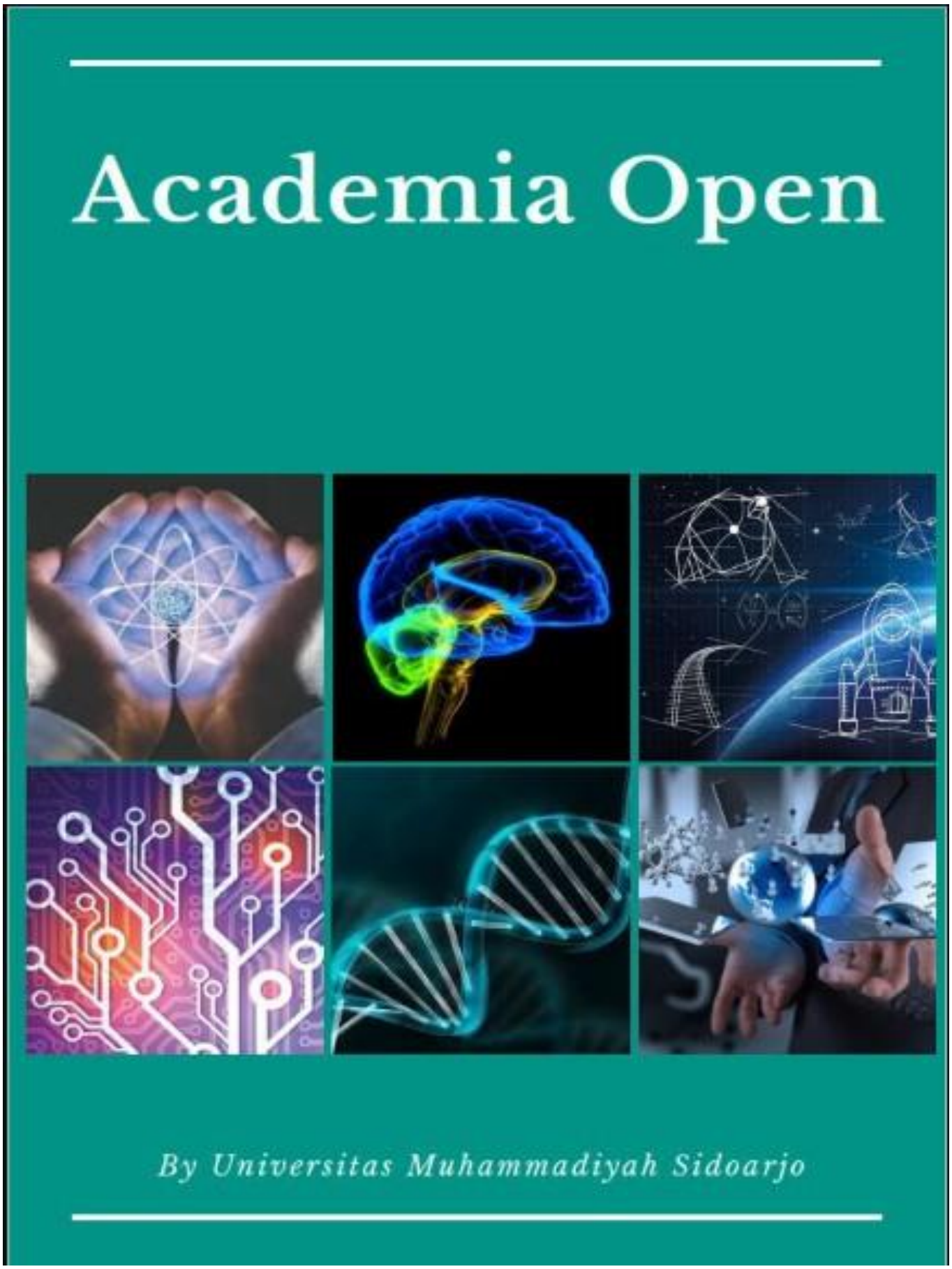
Academia Open

Vol. 11 No. 1 (2026): June
DOI: 10.21070/acopen.11.2026.14724



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Vol. 11 No. 1 (2026): June
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Academia Open

Vol. 11 No. 1 (2026): June
DOI: 10.21070/acopen.11.2026.14724

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Academia Open

Vol. 11 No. 1 (2026): June
DOI: 10.21070/acopen.11.2026.14724

Clinical and Metabolic Factors Associated With Liver Fibrosis Risk (Fib-4 >1.3) in Patients With Rheumatoid Arthritis

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Abstract

General Background: Rheumatoid arthritis (RA) is a chronic inflammatory disease associated with extra-articular manifestations, including liver involvement. **Specific Background:** Liver fibrosis in RA may result from the interaction of inflammatory and metabolic factors. **Knowledge Gap:** Evidence on clinical and metabolic predictors of liver fibrosis risk in RA remains limited. **Aims:** This study aimed to identify factors associated with increased liver fibrosis risk (FIB-4 >1.3) in patients with rheumatoid arthritis. **Methods:** A cross-sectional study was conducted among 156 patients with RA. Clinical, laboratory, and metabolic parameters were analyzed using comparative, correlation, and logistic regression analyses. **Results:** Elevated FIB-4 was observed in 34.6% of patients. Older age, higher body mass index, elevated aspartate aminotransferase levels, diabetes mellitus, and longer disease duration were significantly associated with increased fibrosis risk and were identified as independent predictors. **Novelty:** The study highlights the combined role of demographic, metabolic, and biochemical factors in liver fibrosis risk among RA patients. **Implications:** FIB-4 may serve as a practical non-invasive screening tool to identify patients requiring closer hepatic evaluation and metabolic assessment.

Highlights:

- Approximately one-third of patients with rheumatoid arthritis exhibited elevated liver fibrosis risk based on FIB-4 assessment.
- Older age, higher aspartate aminotransferase levels, greater body mass index, diabetes mellitus, and longer disease duration were independently associated with increased fibrosis risk.

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Academia Open

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• Non-invasive fibrosis screening supports early recognition of hepatic involvement within routine rheumatology practice.

Keywords: Rheumatoid Arthritis, Liver Fibrosis, Fibrosis-4 Index, Metabolic Factors, Diabetes Mellitus

Published date: 2026-06-09

ISSN 2714-7444 (online), https://acopen.umsida.ac.id, published by Universitas Muhammadiyah Sidoarjo

Introduction

Rheumatoid arthritis (RA) is a seropositive, chronic autoimmune disease typically defined by systemic joint inflammation but which also affects hepatic function and balance [1][2]. The convergence of rheumatology and hepatology shows that not only does liver fibrosis in these patients reflect the consequences of hepatotoxic pharmacotherapy, but it is also commonly rooted strongly in metabolic dysfunction-associated steatotic liver disease. The main premise of this clinical theory is the mechanism of a double hit: chronic systemic inflammation aggravating an ongoing metabolic dysfunction, and they are implicated in the progressive fibrotic changes [3].

While the risk of hepatic comorbidities noted to result attendant with drug-related injuries, there is lack of knowledge regarding real determination factors influencing liver fibrosis independent from the toxic effect of drugs. Recent clinical literature discusses this issue and calls for studies to separate the elderly-true-influenzas of obesity and diabetes from the inflammatory epidemic markers so that patients can be better stratified [4][5]. The connections between metabolic syndrome and autoimmune inflammation create an intricate matrix leading to the need for comprehensive metabolic profiling instead of relying solely on pharmacological monitoring to avert severe liver injury [6].

Cross-sectional studies bridge this gap by assessing patients with non-invasive screening tools like the Fibrosis-4 (FIB-4) index to identify high-risk subjects. In general, the methodology consists of stratifying patients according to FIB-4 score and comparing these indices with those of demographic data, body mass index (BMI), disease duration, and levels of liver enzymes [7]. This analysis is based on the use of statistical models (e.g., multivariate logistic regression) that isolate independent predictors of fibrosis, without allowing variables such as age and metabolic comorbidities to be simply quantified against baseline inflammatory activity [8][9].

The empirical outcomes review shows that around one-third of patients evaluated possess an increased risk for liver fibrosis with scores > 1.3. The results of this analysis demonstrate that aged hosts and high serum aspartate aminotransferase (AST) were the most significant independent risk factors for fibrotic progression [10]. Moreover, metabolic factors such as diabetes mellitus and increased body mass index markedly enhance this risk, unequivocally proving that duration of disease exacerbates metabolic liver injury

Upon closer inspection of those results, liver involvement in this patient population may more accurately reflect a highly metabolic failure across multiple organ systems instead of localized iatrogenic injury [11]. The clinical reality necessitates a paradigm shift in routine care, so that FIB-4 index is implemented as a standardised, noninvasive screening process for patients 45 years or older or those with metabolic risk factors. In sum, a comprehensive comprehension of this clinical-metabolic synergy offers the potential for timely interventions as advanced liver tests can be administered promptly to prevent more serious hepatic outcomes [12].

Aim of The Study

To identify clinical and metabolic factors associated with increased liver fibrosis risk (FIB-4 >1.3) in patients with rheumatoid arthritis.

Materials and Methods

Study design and population

This cross-sectional study included 156 patients diagnosed with rheumatoid arthritis according to ACR/EULAR classification criteria. All patients were treated and followed at the clinical base of Bukhara State Medical Institute.

Group stratification

Patients were divided into two groups:

•Group 1: FIB-4 ≤1.3

•Group 2: FIB-4 >1.3

Variables assessed

The following parameters were analyzed:

•Age

•Sex

•Body mass index (BMI)

•Disease duration

•DAS28 score

•ALT

•AST

•Diabetes mellitus

Statistical analysis

Data were analyzed using descriptive statistics. Continuous variables were compared using Student's t-test, categorical variables using χ^2 test. Pearson correlation analysis was applied. Logistic regression was performed to identify independent predictors. A p-value <0.05 was considered statistically significant.

Results

Patient distribution

Out of 156 patients:

•FIB-4 ≤1.3: 102 (65.4%)

•FIB-4 >1.3: 54 (34.6%)

Table 1. Comparison between groups

Parameter	FIB-4 ≤1.3	FIB-4 >1.3	p
Age (years)	48.2 ± 9.4	58.7 ± 8.6	<0.001
BMI	26.8 ± 3.5	29.4 ± 4.2	0.002
DAS28	4.85 ± 0.82	5.02 ± 0.91	0.18
ALT (U/L)	33.1 ± 6.9	38.9 ± 7.8	0.004
AST (U/L)	25.7 ± 5.8	33.9 ± 7.2	<0.001
Diabetes (%)	18.6%	38.9%	0.006
Disease duration >10 years (%)	28%	55%	0.01

Correlation analysis

•Age and FIB-4: r = 0.54; p<0.001

•AST and FIB-4: r = 0.58; p<0.001

•BMI and FIB-4: r = 0.31; p=0.02

•Disease duration and FIB-4: r = 0.36; p=0.01

Table 2. Logistic regression analysis

Factor	OR	95% CI	p
Age	1.08	1.04–1.12	<0.001
AST	1.12	1.06–1.18	<0.001
BMI	1.09	1.02–1.16	0.01
Diabetes	2.21	1.18–4.14	0.01
Disease duration	1.87	1.03–3.39	0.04

Discussion

This study demonstrates that liver fibrosis risk in patients with RA is associated with a combination of demographic, metabolic, and biochemical factors.

Age emerged as the strongest predictor, which aligns with previous studies showing progressive accumulation of liver damage over time [13]. Elevated AST levels reflect hepatocellular injury and are closely linked with fibrosis progression.

Metabolic factors such as obesity and diabetes significantly contribute to liver fibrosis development, supporting the concept of MASLD in RA patients [14]. These findings emphasize that liver involvement in RA is not solely drug-related but rather multifactorial.

The strong correlation between FIB-4 and clinical variables supports its use as a practical and reliable screening tool [15].

Conclusions

All of the bright city sounds mixing together in a city symphony of bad noises. The neon lights of giant building pierce the night like an alien arrow shooting for the heavens and meanwhile illuminating ground zero. People carrying streams pass through lining the buildings, sep-arated from one another only as small grains of ball among a sea of people. The street food fragrances waft into your nostrils, a sizzling hot air oven of vapour, with combustion fumes mixing in like the Dj on the dance floor. And yet, there is an energy here, the city a living organism with its own pulse that beats through streets and drives it on into night.

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